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(54) **BATTERY HALF CELL, A BATTERY AND THEIR MANUFACTURE**

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**ABSTRACT**

There is provided a battery and battery half cell comprising at least one carbon fiber as negative electrode, said carbon fiber comprising a plurality of layers with carbon atoms having graphite structure, said plurality of layers having an ability of intercalating metal ions, said carbon fiber at least partially coated with at least one electrically insulating polymer layer acting as an electrolyte, wherein said insulating polymer layer has been applied with an electro-driven polymerization reaction, wherein said insulating polymer layer is permeable for metal ions, said insulating polymer layer having a stiffness of at least 0.5 MPa, said insulating polymer layer having an ionic conductivity of at least  $10^{-10}$  S/m and an electrical resistivity of at least  $10^{10}$   $\Omega$  m, said insulating layer has a thickness in the interval 10-200 nm. Advantages include possibility to utilize thin layers of electrolytes without creating large ohmic losses, structural batteries can comprise carbon fibers.

